UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

JAN 15 2016

Mr. William T. Walker, Chief
Regulatory Branch
U.S. Army Corps of Engineers, Norfolk District
Fort Norfolk, 803 Front Street
Norfolk, VA 23510-1096

Dear Mr. Walker:

Thank you for your December 1, 2015 request for concurrence on the suitability for ocean disposal of dredged material from Parallel Thimble Shoal Tunnel Project (Thimble Shoal Tunnel) pursuant to Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA). Section 103 of the MPRSA specifies that all proposed operations involving transportation and dumping of dredged material into ocean waters be evaluated for potential environmental impacts. The Secretary of the Army of the US Army Corps of Engineers (Corps) has responsibility for this evaluation using criteria developed by the Administrator of the U.S. Environmental Protection Agency (EPA).

EPA Region 3 has reviewed the Evaluation of Dredged Material for the Thimble Shoal Tunnel, provided by the Corps in accordance with Section 103 of the MPRSA. Based on this review and contingent upon the conditions included in this letter, EPA concurs that the proposed dredged material meets the Ocean Disposal Criteria (40 CFR 227) and can be placed in the Norfolk Ocean Disposal (NODS).

Project Overview

The Thimble Shoal Tunnel is located near the mouth of the Chesapeake Bay. Thimble Shoal Tunnel is a portion of the Chesapeake Bay Bridge Tunnel (Thimble Shoal Tunnel) which runs beneath the Thimble Shoal Channel, one of the main channels that is authorized to a depth of 55-ft mean lower low water (MLLW). The proposed project includes the construction of a secondary two-lane immersed tunnel to run parallel to the existing Thimble Shoal Tunnel. The Thimble Shoal Tunnel project requires the removal of approximately 1.7 million cubic yards (cy) of new work material from the lower Chesapeake Bay prior to construction. The material is proposed for placement in the Norfolk Ocean Disposal Site (Norfolk or NODS) in accordance with 40 CFR. § 228.15. The request to place dredged material in the Norfolk Ocean Disposal Site is among placement options for the Thimble Shoal Tunnel project. The objective of this exercise was to determine whether the material would be in compliance with the Ocean Disposal Criteria upon selection of immersed tube as the means for tunnel construction.

EPA Region 3 conducted an independent determination of compliance with the Ocean Disposal Criteria based on the following:

Exclusionary Criteria

In accordance with 40 CFR § 227.13(b), dredge material that meets the criteria set forth in the following paragraphs (b)(1), (2), or (3) of this section is environmentally acceptable for ocean dumping without further testing under this section:

(1) Dredged material is composed predominantly of sand, gravel, rock, or any other naturally occurring bottom material with particle sizes larger than silt, **and** the material is found in areas of high current or wave energy such as streams with large bed loads or coastal areas with shifting bars and channels; or

(2) Dredged material is for beach nourishment or restoration and is composed predominantly of sand, gravel or shell with particle sizes compatible with material on the receiving beaches; or

(3) When the material proposed for dumping is substantially the same as the substrate at the proposed disposal site; **and** the site from which the material would be dredged is far removed from known existing and historical sources of pollution so as to provide reasonable assurance that such material has not been contaminated by such pollution.

The material in the Thimble Shoal Tunnel does not meet the exclusionary criteria set forth under 40 CFR § 227.13(b).

Evaluation of the Liquid Phase – Water Quality Criteria (WQC)

Thimble Shoal Tunnel is a new work project that was divided into four dredging units (DU) to evaluate sediment within the dredging footprint. Borings were collected from 15 locations with depth intervals (0 to -10ft or -20ft) below sediment surface to the project depth to accommodate for the variable sediment types. To ensure representation of different grain sizes, three sites were sampled for reference material, Willoughby Bank (top and bottom) and Atlantic Ocean.

Despite the presence of nutrients, some metals and dioxin/furans in the DUs, none of the constituents exceeded acute water quality criteria. Based on the laboratory reporting limit, cyanide (10 ug/L) exceeded acute water quality criteria (1.0 ug/L) therefore, the dilution factor for cyanide was used to determine the Limiting Permissible Concentration (LPC) compliance for water quality criteria as it was the most conservative.

A maximum 9-fold dilution is required in each DU to comply with the acute and chronic cyanide criteria inside the boundary of Norfolk. Results of the STFATE model indicated that a 97 to 99-fold dilution would occur 4 hours following placement for all four DUs and within the boundaries of the disposal zone. This calculation was based on barge placement volumes up to 4,000cy at the center of Norfolk.

Based on the information above, the liquid phase of the material is in compliance with 40 CFR § 227.6(c)(1) and 227.27(a)(1).

Evaluation of the Liquid and Suspended Particulate Phases – Suspended Particulate Phase Bioassay-Water Column Toxicity

Bioassays were conducted in each DU using the following three species: *Mytilus galloprovincialis* (blue mussel), *Americamysis bahia* (opossum shrimp), and *Menidia beryllina* (inland silverside). There was abnormal development of *M. galloprovincialis* in the top DU of dredging Area 3 at 66% compared to 75% for the lab control. However, each species had an EC_{50}/LC_{50} value greater than 100% in each DU. Additionally, the site elutriate was not toxic to *A.bahia* or *M. beryllina.*

The water column LPC for ocean placement is equivalent to 0.01 of EC50 within a 4-hour dilution period. The most conservative LPC value for *M. galloprovincialis* would require a 99-fold dilution for placement at NODS. Neither *A.bahia* nor *M. beryllina* exhibited acute toxicity as a result of the site elutriates. Results of the STFATE model indicated that a 100-fold dilution would occur within the site boundary in 4 hours for Dredging Area 3 and the remaining DUs to meet the LPC. Therefore, the suspended particulate phase of the material complies with 40 CFR § 227.6(c)(2) and 227.27(b).

Solid Phase Toxicity Evaluation-Benthic Toxicity

Ten-day toxicity tests were conducted on project materials using two benthic species, *Ampelisca abdita* and *Leptocheirus plumulosus*. From the 15 DUs (top and bottom), one composite from each unit was evaluated. The survival rate for *A. abdita* ranged from 95-100% while *L. plumulosus* ranged from 88 to 99% compared to the survival rate in the Willoughby Bank and Atlantic Ocean reference sediments at 93 and 97% respectively.

The dredged material does not meet the limiting permissible concentration (LPC) for benthic toxicity when bioassay organisms' mortality is statistically greater than in the reference sediment **and** exceeds mortality in the reference sediment by at least 20%. Mortality in the dredge material is not statistically greater than in the reference sediment, and does not exceed mortality in the reference sediment by 20%. Therefore, the dredged material meets the LPC for benthic toxicity and complies with the benthic bioassay criteria set forth in 40 CFR § 227.13(c)(3).

Solid Phase Bioaccumulation Evaluation

Twenty-eight day bioaccumulation tests were conducted on the solid phase of the project material for the contaminants of concern using two appropriate sensitive benthic marine organisms, *Nereis virens* (sand worm) and *Macoma nasuta* (blunt nose clam). Tissue analyses were conducted for metals, PAHs, dioxin/furan [(2, 3, 7, 8-TCDF) in TS-3ST worm tissue] congeners, SVOC [phenol in TS-4NT and TS-4SB only and bis (2-ethylhexyl phthalate) in TS-2MT, TS-2NT, TS-3NT, TS-3SB only], chlorinated pesticides [(mirex) in TS-2MT only].

Mean arsenic in *M. nasuta* tissue (TS-2SB only) statistically exceeded the tissue concentrations in the Willoughby Bank reference. However, the clam tissue did not exceed the pre-test tissue concentrations therefore, mean arsenic in *M. nasuta* tissue was not significantly greater than the baseline concentrations prior to exposure to sediment. Contaminant

concentrations in tissues exposed to sediment were compared to the U.S. Food and Drug Administration (FDA) Action/Guidance/Tolerance (Action) Levels. The comparison resulted in none of the contaminant concentrations, for which there are FDA Action Levels, exceeded such thresholds in the tissues or organisms exposed to the project sediment. In addition, none of the mean contaminant concentrations in the tissues exposed to sediment exceeded the mean concentrations detected in Willoughby Bank and Atlantic Ocean reference sediments.

When bioaccumulation of contaminants in dredged material tests exceeds that in the reference, general risk-based evaluations must be conducted to evaluate compliance with 40 CFR § 227.13(c)(3). EPA Region 3 conducted such an evaluation and determined there is no potential for undesirable effects due to bioaccumulation as a result of the presence of individual chemicals or of the solid phase of the material as a whole. Accordingly, the solid phase of the material proposed for disposal meets the ocean disposal criteria set forth in 40 CFR § 227.6(c)(3) and 227.27(b).

In accordance with the Water Resources Development Act of 1992 amendments to MPRSA, disposal activities must be conducted in accordance with the Norfolk Ocean Disposal Site Management and Monitoring Plan (SMMP) including the following:

- Disposal will occur within boundaries of the site and at least 100 meters (300 ft.) from the perimeter of the disposal site;
- The disposal site shall be surveyed before and after the project to ensure proper placement of materials and compliance with Norfolk site conditions;
- Each disposal vessel will have an Electronic Tracking System and the Norfolk Army Corps will maintain all data associated with the project; and
- The Norfolk Army Corps will provide EPA with a disposal summary report following completion of the project.

Again, this concurrence is conditioned upon implementation of the above requirements and is valid for a term of three years from January 15, 2016. Use of the Norfolk Ocean Disposal Site after January 15, 2019 will require further evaluation of the proposed dredged material. Should you have any questions regarding this concurrence or use of the Norfolk Ocean Disposal Site, please contact me or Mrs. Sherilyn Lau at 215-814-2786.

Sincerely,

John Zorren, Associate Director
Environmental Assessment & Innovation Division
U.S. EPA, Region III